Grade Levels 4-8
45-90 Minutes

Grade Level Texas Essential Knowledge and Skills (TEKS) by Content Area:

Mathematics

Grade 4: 4.13A; B; 4.14B; C; D; 4.15A; 4.16A

Grade 5: 5.5A; 5.13A; B; C; 5.14A; B; C; D; 5.15A; 5.16A; B

Grade 6: 6.10A; B; C; D; 6.11A; B; C; D; 6.12B; 6.13A; B

Grade 7: 7.11A; B; 7.12A; B; 7.13A; B; C; D; 7.14B; 7.15B

Grade 8: 8.4; 8.4A; B; 8.12A; B; C; 8.13A; 8.14A; B; C; D; 8.16A; B

Science (Environmental, Ecology) {2009}

Grade 4: 1A; B; 2A; B; C; D; E; F; 3A; 4A; B; 7C

Grade 5: 1A; B; 2A; B; C; D; E; F; G; 3A; 4A; B; 9A; C

Grade 6: 1A; B; 2A; B; C; D; E; 3A; 4A; B

Grade 7: 1A; B; 2A; B; C; D; E; 3A; D; 4A; B; 8C

Grade 8: 1A; B; 2A; B; C; D; E; 3A; D; 4A; B; 11A; D

Social Studies {2010}

Grade 4: 9C, 21B; C; D; 22A; B; C; D; E; 23A; B

Grade 5: 9B; 24B; C; D; 25A; B; C; D; E; 26A; B

Grade 6: 6B; C; 7B; 21B; D; 22A; B; C; D; E; F; 23A; B

Grade 7: 9C; 10A; 21B; C; D; E; F; G; 22A; B; C; D; 23A; B

Grade 8: 29B; C; D; E; F; G; H; I; 30A; B; C; D; 31A; B

Garbage Investigation

Overview

Students analyze beach trash, discuss the problems posed by it and propose solutions to these problems.

Objectives

- Discuss the difference between natural and man-made objects.
- Sort, record, graph, compare and discuss garbage data.
- Problem-solve about garbage issues.

Prerequisites

Unit 1

Vocabulary

recycling
the act of processing used or abandoned materials to create new products.

decompose
to separate into constituent parts or elements, or into simpler compounds.

Setting

Indoors/Outdoors *(outdoors is preferred)*

Materials

- **pencils**
- **Ocean Conservancy Ocean Trash Data Form** *(located at the end of this lesson)*
- **garbage**
- **tarp** *(if indoors)*
- **journals**
- **graph paper**
- **sturdy gloves for each student**
- **Texas Adopt-A-Beach Cleanup Data** *(located at the end of this lesson)*

Developmental Modifications

Use the K-3 journal page for this unit. Young children will need close supervision at the beach and should exercise extreme caution with sharp objects. When picking up garbage, always wear gloves. If appropriate, graph the data as a class.

Background

Beaches are a place to play, exercise, socialize, see wildlife and find solitude. They attract tourists and can be an immense draw for those who live near them. Beaches are impacted by a number of issues caused by humans, including problems associated with shoreline garbage. *Caution: Students will touch garbage in this activity. Exercise caution when touching garbage! Students should wear gloves. Garbage can be emptied onto a plastic tarp or plastic bag to minimize the mess. There is always a potential for sharp objects. Teachers, or a responsible older student, should sort them out. Students should wash their hands when they finish this activity.*

Ways to Address Problems Created Through Beach Litter

Service Learning

Service learning integrates community service work into classroom learning and curriculum. Community issues such as dirty beaches or beach closings can be addressed through service learning. When integrated into a curriculum, the Texas General Land Office Adopt-A-Beach Program cleanups are an example of service learning.

Adopt-A-Beach

Join the Texas General Land Office Adopt-A-Beach Program to create positive change for your beach through litter monitoring along the Texas coast. Beach Guardians (often referred to as adopters) from the Texas Adopt-A-Beach Program make three beach visits per year. Participants analyze data and take action to improve their beach (see the Adopt-A-Beach activity in this unit). More information about the Beach Guardian program can be found at **texasadoptabeach.org**.

Beach Litter Problems

- **Cigarette Butts**
  Cigarette filters are the most commonly found items on Texas beaches and throughout the world. Filters are made of cellulose acetate, a type of plastic, which can take up to five years to break down and even longer to decompose. Children playing on beaches can put cigarette filters in their mouths. Studies show that chemicals in cigarettes can be harmful to microorganisms that support wildlife.
- **Balloons**
  Balloons and their ribbons entangle animals and are sometimes ingested when mistaken for food, causing injury or death. Balloons can also be a problem for boaters if their propellers become entangled by the string.
- **Food and Food Packaging**
  Bags can entangle animals or be accidentally ingested by them, causing injury or death. Leftover food may attract additional wildlife to the beach, resulting in increased animal droppings, which can lead to high bacteria levels in the water. High bacteria levels are a reason for beach closings.
- **Beverage bottles** *(glass, aluminum, plastic)*
  Broken glass and sharp aluminum points can injure people and wildlife. Sea birds, sea turtles and other marine life often mistake plastic bottles for food, which can be extremely harmful.
- **Fishing line**
  Fishing line can cause wildlife to become entangled, leading to injury or death.

Activities: Part One

1. Give students one minute to think about an experience they have had on a beach or near the shore. In pairs, have students share their experiences with each other for one or two minutes.
2. Ask students, if they have been to the beach, what they like about it. Take a few answers. Ask students what problems they have seen at the beach. The list of answers might include: too crowded, no lifeguards, garbage, dirty, too cold, too hot. Acknowledge as many of these answers as possible. Focus on the garbage issue. Ask students: What do we mean when we say the beach is dirty? This can mean garbage in the water or on the shoreline. How does garbage get to the beach? Human hands are behind garbage on the beach. People can leave trash at a beach or it can be left elsewhere, then blown or washed onto the shore. Trash also makes its way to the beach from inland sources such as sewer overflows and storm drains, landfills, and manufacturing and sewage treatment plants. In the Gulf of Mexico, the currents wreak havoc on our Texas coastline, meaning anything dumped in the Gulf will most likely end up on a Texas beach. Consider giving the example of a student's room. How would you like it if someone came and dumped a load of trash in your room and messed everything up? How would you like to live in that type of environment?
3. Investigation: What items do students think they would find on beaches? Tell students they are going to investigate what items are really found on beaches. Choose one of the following two options:
   - Bring in a bag of garbage found on a Texas beach.
   - During a class field trip to the beach, have students pick up garbage and bring the bag to class. *Note: Caution students against picking up any sharp objects. Have adult chaperones assist with this.*
4. Have students record data on the garbage they find. Garbage can be sorted and recorded as a class, or divided up and sorted by students in small groups. Use the Ocean Conservancy Ocean Trash Data Form provided (Unit 3, Pages 6 and 7 of the journal pages). To add interest, add a few natural objects that might be found on the beach (feathers, shells, driftwood, etc.) into the mix of garbage for later discussion.
5. Complete and discuss the data analysis questions from the journal pages. Also, discuss the following:
   - Is this all considered garbage? Some items you find can be recycled. Discuss the benefits of recycling and/or reusing an object. If you have put natural objects in with the garbage, discuss the fact that natural objects belong in the ecosystem.
   - How are natural objects different from those produced by people? When natural objects decompose or break down in the ecosystem, they give back to the area in the form of nutrients for decomposers, insects and scavengers. They belong along the shoreline.
   - What problems could garbage create on the beach? Garbage can cause problems for humans and wildlife. Trash on beaches can cause people to care less about beaches or feel unhappy about their community. It can transform a beach into an eyesore, cause health issues and entangle animals. Sometimes trash is accidentally eaten by animals, causing sickness or death.
6. What can we do to help solve the problem of garbage on beaches? Carry out what you carry onto beaches, properly dispose of all trash, pick up extra garbage found on the beach, recycle and educate others about beach litter issues.
7. Solution list: Based on the class discussion, have each student make a list of possible solutions. Ask them to each create a list of three things they can do to help reduce garbage on the beach. Students can then share their individual lists to compile a class solution list *(see page 4 for suggestions)*.

ADOPT A BEACH

Schools and community groups can adopt a stretch of beach through the Beach Guardian program. The commitment includes three cleanups per year. Students receive an official Adopt-A-Beach youth patch and certificate of adoption. Supplies are available to Beach Guardians on request.

TAKE RESPONSIBILITY

Always pick up your garbage, even the small pieces and food waste. Garbage can cause problems for humans and wildlife.

VOLUNTEER

Participate in the Texas General Land Office Adopt-A-Beach Program's Fall or Spring cleanup events. Each year, coastwide cleanups are held in September and April. Visit texasadoptabeach.org for more information.

TEXAS GENERAL LAND OFFICE
ADOPT™ a BEACH
GEORGE P. BUSH, COMMISSIONER

EDUCATE OTHERS

Explain the problems associated with shoreline trash to other people. Help them see how important it is for each of us to take responsibility for our actions.

TALK TO LOCAL AND STATE OFFICIALS

Encourage local and state officials to enforce litter laws and support them by providing proper disposal containers and adequate staff.

PICK UP GARBAGE

Bring an extra garbage bag with you when you go to the beach and spend some time making the area cleaner than when you arrived. This sets a great example for others at the beach. It's contagious—others will follow in your footsteps.

Activities: Part Two

1. Graph the data collected while sorting garbage.
2. Graph the Texas Adopt-A-Beach Program data provided.
3. Compare the graphs of your beach visit data and the data collected during an Adopt-A-Beach Cleanup. Remember that you are comparing your site to one that is likely different in size and volunteer numbers.
4. Discuss the following as a class:
   - What is similar about what was found?
   - What is different about what was found?
   - What might account for any differences?
   - Discuss what makes graphing a useful tool. Graphing is a useful tool for comparison because it allows people to see a visual representation of data.
   - What conclusions can you draw from these sets of data?

Wrap-Up

Schools, classrooms, families and individuals can take action against the problem of beach garbage by participating in an Adopt-A-Beach cleanup or by becoming an official Beach Guardian and adopting a mile of coastline. Your school can integrate the idea of service learning into the curriculum by addressing the beach issues in this activity. To get involved contact the Texas General Land Office about upcoming Adopt-A-Beach cleanups.

Extension

Explore what happens to the garbage in your school or community.

- Where does it go?
- Is some of it recycled?
- Investigate some of the problems associated with landfills and solid waste management.
- What are ways that these problems can be addressed within your school or community?

The Texas General Land Office values your thoughts and feedback. Please provide information about any oversights, errors or omissions as well as particular activities that students find interesting. Send comments to the Texas General Land Office Adopt-A-Beach Program at **beach@glo.texas.gov**.

Adapted with permission from **Great Lakes in My World**, *a lesson plan created by the Alliance for the Great Lakes.*

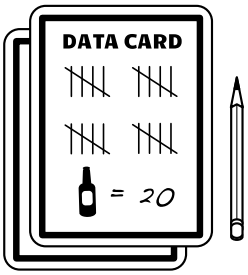
VOLUNTEER
TRASH DATA FORM

TEXAS GENERAL LAND OFFICE
ADOPT™ a BEACH
GEORGE P. BUSH, COMMISSIONER

Ocean and waterway trash ranks as one of the most serious pollution problems choking our planet. Far more than an eyesore, a rising tide of marine debris threatens human health, wildlife, communities and economies. Ocean trash is entirely preventable, and the data you collect today is invaluable for helping us educate the public, businesses and government officials about the scale and consequences of our marine debris problem. **Thank you for participating in one of our beach cleanups!** Your commitment is the first step toward ensuring a cleaner Texas coast year-round.

HERE IS HOW IT WORKS:

Pick up the trash



Record the data

Dispose of trash properly

CLEANUP SITE INFORMATION:

Cleanup Site Name

County

Nearest Crossroad

CATEGORY OF CLEANUP:

Coastal ☐ **Inland Waterway** ☐

TYPE OF CLEANUP:

Land ☐ **Underwater** ☐ **Watercraft** ☐

NUMBER OF VOLUNTEERS WORKING ON THIS CARD:

Adults ☐ **Children** ☐

MOST UNUSUAL ITEM COLLECTED:

PLEASE RETURN THIS CARD TO YOUR AREA COORDINATOR OR MAIL OR EMAIL IT TO:

Texas General Land Office Adopt-A-Beach Program
P.O. Box 12873
Austin, Texas 78711-2873

beach@glo.texas.gov
texasadoptabeach.org

Trash Collected

Citizen scientist: Pick up all trash and record all items you find below. No matter how small the items, the data you collect is important.

Example:

		Total #
Plastic Bags:	𝍸 III =	8

Most Likely to Find Items:

	Total #		Total #
Cigarette Butts:	=	Beverage Bottles (plastic):	=
Food Wrappers (candy, chips, etc.):	=	Beverage Bottles (glass):	=
Take Out/Away Containers (plastic):	=	Beverage Cans:	=
Take Out/Away Containers (foam):	=	Grocery Bags (plastic):	=
Bottle Caps (plastic):	=	Other Plastic Bags:	=
Bottle Caps (metal):	=	Paper Bags:	=
Lids (plastic):	=	Cups and Plates (paper):	=
Straws/Stirrers:	=	Cups and Plates (plastic):	=
Forks, Knives and Spoons:	=	Cups and Plates (foam):	=

Fishing Gear:

	Total #
Fishing Buoys, Pots and Traps:	=
Fishing Net and Pieces:	=
Rope (1 yard = 1 piece):	=
Fishing Line (1 yard = 1 piece):	=

Packaging Materials:

	Total #
6-Pack Holders:	=
Other Plastic/Foam Packaging:	=
Other Plastic Bottles (oil, bleach, etc.):	=
Strapping Bands:	=
Tobacco Packaging/Wrap:	=

Other Trash:

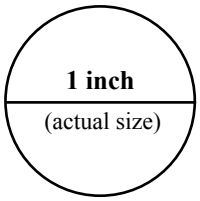
	Total #
Appliances (refrigerators, washers, etc.):	=
Balloons:	=
Cigar Tips:	=
Cigarette Lighters:	=
Construction Materials:	=
Fireworks:	=
Tires:	=

Personal Hygiene:

	Total #
Condoms:	=
Diapers:	=
Syringes:	=
Tampons/Tampon Applicators:	=
Clothing/Shoes:	=

Tiny Trash Less Than 1 Inch:

	Total #
Foam Pieces:	=
Glass Pieces:	=
Plastic Pieces:	=



Dead/Injured Animal	Status	Entangled	Type of Entanglement Item
	Dead or **Injured**	**Yes** or **No**	

Items of Local Concern:

1. 2. 3.

Cleanup Summary:

No. of Trash Bags Filled	**Weight of Trash Collected**	**Distance Cleaned**
	lbs.	miles

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

DATA ANALYSIS

Using the Ocean Trash Data Form, answer the following questions about the trash you collected.

1. What item did you find the most of? Where did it come from?

2. What item did you find the least of?

3. What category was the most popular for items that you found? (Check one)
   - ❍ Recreational Activities (evidence of people having fun at the beach)
   - ❍ Fishing/Boating (trash from commercial fishing or boat/vessel activities)
   - ❍ Smoking-related (cigarette filters, lighters, packaging)
   - ❍ Dumping (old appliances, batteries, car parts, tires)
   - ❍ Eating (food wrappers, food packaging, napkins, utensils)

4. What surprised you about what you found? How did it make you feel?

5. What problems might be created by shoreline trash? List two to four problems.

6. What three solutions do you think could help solve the problem of beach litter?

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

VISUAL DATA ANALYSIS

1. Draw the object you found most often. Label it.

2. How many did you find?

_____

_____

3. Draw the most unusual object that you found. Label it.

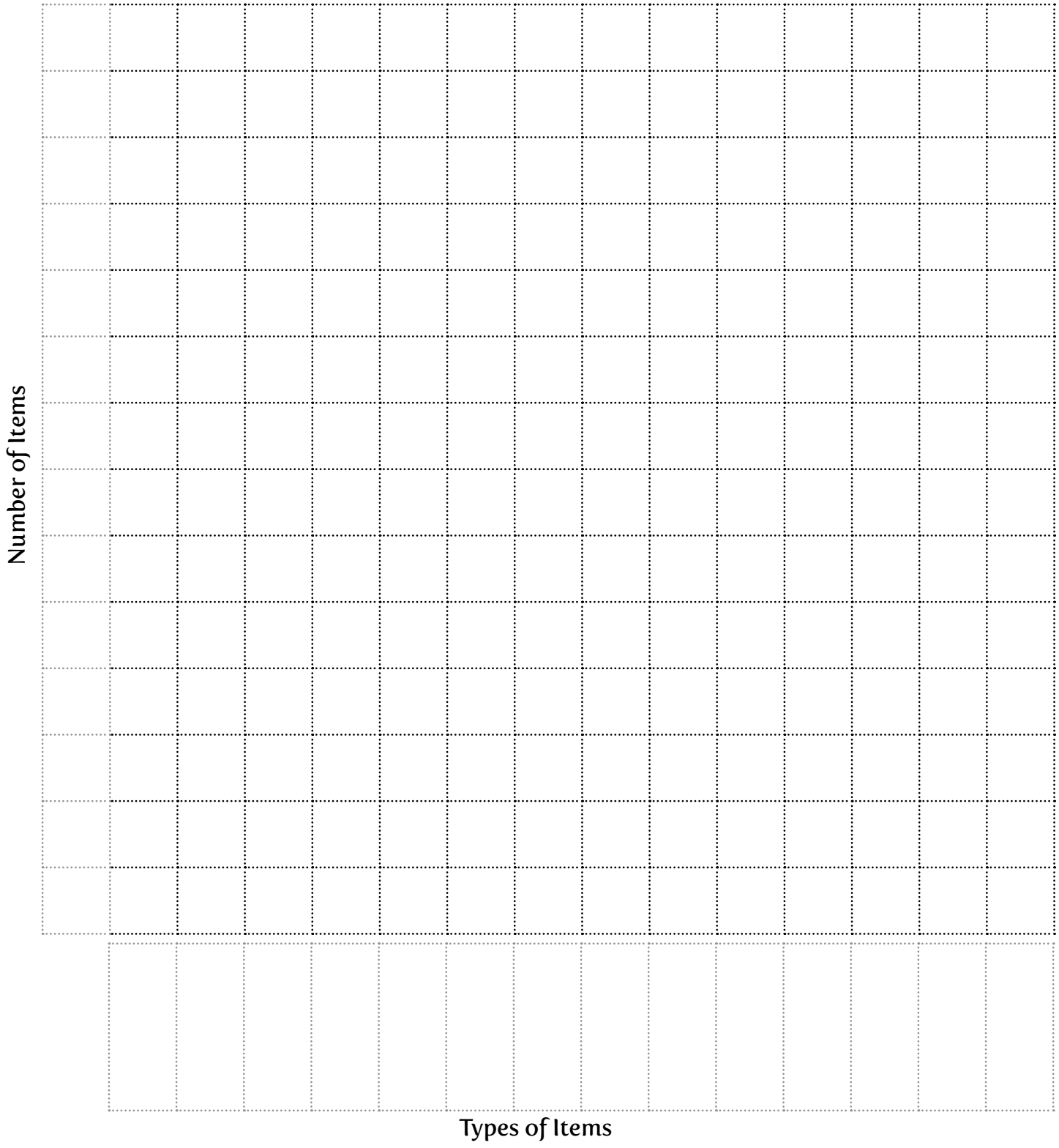
4. Draw a clean beach. Include any animals and plants you think might live there.

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

GRAPHING YOUR DATA

Make a bar graph of the data you collected. If you collected many types of items, you may want to group them into categories (e.g., most likely to find items, fishing gear, other trash, packing materials, etc.).



Name:_____ **Date** _____

Unit 3 | Data

TEXAS ADOPT-A-BEACH CLEANUP DATA

Categorized Items	Total Items	Percent of Total
Most Likely to Find Items		
cigarette butts	29,792	13.86%
food wrappers (candy, chips, etc.)	11,542	5.37%
take out/away containers (plastic)	3,441	1.60%
take out/away containers (foam)	3,166	1.47%
bottle caps (plastic)	44,477	20.70%
bottle caps (metal)	6,025	2.80%
lids (plastic)	8,305	3.86%
straws/stirrers	8,387	3.90%
forks, knives, spoons	4,770	2.22%
beverage bottles (plastic)	22,418	10.43%
beverage bottles (glass)	3,602	1.68%
beverage cans	7,015	3.26%
grocery bags (plastic)	5,623	2.62%
other plastic bags	4,955	2.31%
paper bags	1,069	.50%
cups and plates (paper)	2,473	1.15%
cups and plates (plastic)	3,837	1.79%
cups and plates (foam)	3,166	1.47%
Category Totals	174,063	80.99%

Name:_____ **Date** _____

Unit 3 | Data

TEXAS ADOPT-A-BEACH CLEANUP DATA

Categorized Items	Total Items	Percent of Total
Fishing Gear		
fishing buoys, pots and traps	797	.37%
fishing nets and pieces	2,079	.97%
rope (1 yard/meter = 1 piece)	11,476	5.34%
fishing line (1 yard/meter = 1 piece)	5,984	2.78%
Category Totals	20,336	9.46%
Other Trash		
appliances (refrigerators, washers, etc.)	79	.04%
balloons	1,288	.60%
cigar tips	2,690	1.25%
cigarette lighters	1,230	.57%
construction materials	2,432	1.15%
fireworks	689	.32%
tires	147	.07%
Category Totals	8,555	4.00%

Name:_____ **Date** _____

Unit 3 | Data

TEXAS ADOPT-A-BEACH CLEANUP DATA

Categorized Items	Total Items	Percent of Total
Packaging Materials		
6-pack holders	685	.32%
other plastic/foam packaging	4,382	2.04%
other plastic bottles (oil, bleach, etc)	2,819	1.31%
strapping bands	1,805	.84%
tobacco packaging/wrap	1,276	.59%
Category Totals	10,967	5.10%

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

GRAPHING TEXAS ADOPT-A-BEACH CLEANUP DATA

Make a bar graph of the Adopt-A-Beach Cleanup data. You may want to group items into categories (e.g., most likely to find items, fishing gear, other trash, packing materials, etc.).